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Proposed Plan for the 1100-EM-1 Operable Unit, Hanford

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Prepared for the U.S. Department of Energy
Office of Environmental Restoration and Waste Management

United States
Department of Energy
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Approved for Public Release

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EPA

PROPOSED PLAN FOR THE 1100-EM-1 OPERABLE UNIT AT HANFORD, WASHINGTON

JANUARY 1993

INTRODUCTION

The 1100-EM-1 Operable Unit (OU) is located in the southern-most portion of the Department of Energy (DOE) Hanford Site, adjacent to the City of Richland in Benton County, Washington. The Environmental Protection Agency [(EPA) the lead agency], in conjunction with the Washington Department of Ecology [(Ecology) the support agency] and DOE (the responsible agency), assigned this OU the highest priority amongst all Hanford Site OU's. This Proposed Plan (Plan) highlights the detailed information that can be found in the Final Remedial Investigation and Feasibility Study - Environmental Assessment Report (Final RI/FS-EA Report) currently available for public review and comment. The reader should consult the Final RI/FS-EA Report and the Administrative Record file to obtain complete information regarding the proposed remedial actions. The Administrative Record file contains information used in the evaluation of the site and cleanup alternatives. The Administrative Record is available at the following locations:

U.S. Department of Energy
Richland Operations Office
Administrative Record Center
345 Hills Street
Richland, Washington 99352

EPA Region 10
Superfund Record Center
1200 Sixth Avenue
Park Place Bldg., 7th Floor
Mail Stop: HW-074
Seattle, Washington 98101

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), section 117(a), requires the preparation of a plan for site remediation that is available for public comment. The purpose of this Plan is to highlight the Final RI/FS-EA Report, provide a brief analysis of remedial alternatives under consideration, identify the preferred alternative, and provide members of the community with information on how they can participate in the remedy selection process. ***Public participation is strongly encouraged, as critical comments on all the alternatives presented are an important contribution to the process of selecting a remedy and can influence EPA's decision. The preferred alternative presented here is not necessarily the final remedial action plan that will be put forth in the Record of Decision (ROD). An alternate plan may be selected depending upon new information that EPA considers as a result of public comment.***

All the alternatives, including the proposed remedial actions associated with the preferred alternative, were evaluated to satisfy the requirements of the National Environmental Policy Act (NEPA). A summary of the NEPA values that were evaluated is presented in table 1. In accordance with DOE policy under DOE Order 5400.4, NEPA values were integrated into the procedural and documentation requirements of CERCLA in order to analyze any potential environmental consequences of the proposed actions and the other alternatives. This was accomplished primarily by integrating the relevant aspects of the RI/FS required under CERCLA with the EA aspects required under NEPA into one document, the Final RI/FS-EA Report. However, nothing in this Plan, or other documents to be prepared, is intended to present a statement on the legal applicability of NEPA to remedial actions under CERCLA.

ACTIVITIES TO DATE

The 1100-EM-1 OU, one of four OU's within the 1100 Area, was placed on the National Priorities List in July 1989. Due to the presence of groundwater contamination and the close proximity of the North Richland well field, the 1100-EM-1 OU was assigned the highest priority. The Final RI/FS-EA Report activities at the 1100-EM-1 OU were initiated in 1989, and the Phase I RI/FS was completed in August 1990. A draft of the Final RI/FS-EA Report is currently available for public review.

Recent efforts on the part of DOE, EPA, Ecology, and others to accelerate the characterization and remediation of the entire 1100 Area have led to the initiation of an expedited investigation of the 1100-EM-2, 1100-EM-3, and 1100-IU-1 OU's. This decision was based on the desire to accelerate the process of site cleanup in order to surplus properties as soon as possible, as well as the belief that subunits within these OU's did not present adverse risks to public health and the environment. In lieu of extensive field investigations, the subunits will be characterized by analysis of existing waste information, detailed visual inspections, and interviews with site personnel. Where required, limited

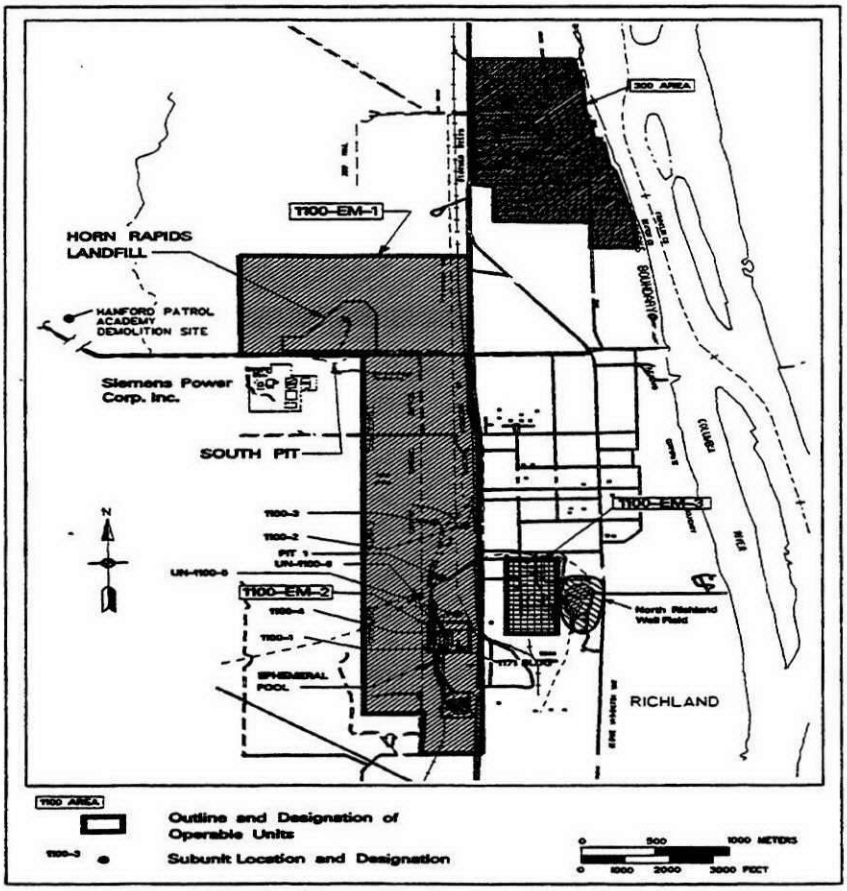

Figure 1. 1100-EM-1 Operable Unit

field investigations will be conducted to determine if a release of hazardous material has occurred.

It is expected that results of these activities will be available by spring of 1993 and will be incorporated into the Final RI/FS-EA Report as an addendum. The subsequent ROD developed from the Final RI/FS-EA Report and addendum will then address the entire 1100 Area.

SITE BACKGROUND

The 1100 Area is the central warehousing, vehicle maintenance, and transportation distribution center for the entire Hanford Site. A wide range of materials and potential waste products were routinely used at and near the 1100 Area. The Final RI/FS-EA Report identified three subunits within the 1100-EM-1 OU that contained contaminants at levels that may pose potential long-term risks to human health. A description of each of these subunits and the contaminated media is provided below. The location of each of the subunits is shown on figure 1.

- Discolored Soil Site: The location of an unplanned release onto the ground surface of bis(2-ethylhexyl)phthalate (BEHP) that resulted in the contamination of up to 340 cubic meters (440 cubic yards) of soil.

- Ephemeral Pool: An elongated manmade depression adjacent to a parking area where runoff water collects and evaporates. Up to 250 cubic meters (340 cubic yards) of soils contaminated with polychlorinated biphenyls (PCB's) from an unknown release are at this site.

- The Horn Rapids Landfill (HRL): A solid waste facility used primarily for the disposal of office and construction waste, asbestos, sewage sludge, fly ash, and reportedly numerous drums of organic liquids. The remedial investigation did not confirm the presence of these drums. Contaminants of concern are the asbestos distributed throughout the landfill and approximately 460 cubic meters (600 cubic yards) of PCB-contaminated soils. Groundwater is contaminated with trichloroethene (TCE) and nitrates in the vicinity of the HRL. While the exact nature of the source and release of the contamination has not been determined, it is believed to have originated offsite. The contamination consists of a TCE plume 1.6 kilometers (1 mile) long and 0.3 kilometers (0.2 miles) wide, and a nitrate plume 2 kilometers (1.3 miles) long and 0.8 kilometers (0.5 miles) wide. The plumes are believed to originate upgradient of the HRL and currently extend below the HRL and downgradient to the northeast.

SCOPE AND ROLE OF ACTION

This Plan addresses contaminated soils found at the subunits identified as: Discolored Soil Site; Ephemeral Pool; HRL; and the contaminated groundwater in the vicinity of the HRL. The current and expected future use of the 1100 Area is industrial. The potential threat to human health from these subunits is associated with long-term worker exposure to contaminated media through direct contact, ingestion, or the inhalation of fugitive dust. The cleanup objectives are to prevent current or future exposure to the contaminated media through treatment, containment, or the use of institutional controls and to prevent potential migration of soil contaminants to the groundwater.

SUMMARY OF SITE RISKS

During the Final RI/FS-EA Report, analyses were conducted to estimate potential human health or environmental risks that could result if the soil and groundwater contamination at the OU

were not remediated. These analyses are commonly referred to as a baseline risk assessment. Three separate baseline risk assessments were performed for the 1100-EM-1 OU. The Baseline Industrial Scenario Risk Assessment focused on industrial site workers and potential adverse health affects that could result from exposure to onsite contaminants in soil and groundwater. The Baseline Residential Scenario Risk Assessment was performed to establish a conservative baseline to evaluate potential risks associated with future land use if the land use changed to residential. That evaluation was undertaken to address uncertainty associated with potential future land use. An Ecological Risk Assessment was also undertaken to evaluate potential adverse effects of onsite contaminants on the flora and fauna present in onsite ecosystems. That assessment indicated no current adverse impacts to onsite ecosystems associated with 1100-EM-1 subunit contaminants.

Potential adverse human health effects associated with exposure to site contaminants are expressed in two ways. The first is potential increased cancer risks associated with long-term exposure and are expressed exponentially as 1E-04, 1E-05, 1E-06 (one in ten thousand, one in one hundred thousand, one in a million). This means that for a 1E-04 risk, if 10,000 people were exposed to a contaminant of concern over a long period of time (typically 70 years), one additional person would be expected to be diagnosed with cancer. Based on current national cancer rates, 2,500 people out of a population of 10,000 are expected to be diagnosed with cancer. Under a 1E-04 risk, 2,501 cancer diagnoses would be expected. For non-carcinogenic health impacts, a Hazard Index (HI) is calculated. An HI less than or equal to 1.0 is not considered to pose a potential adverse human health risk.

Potential adverse health effects for onsite industrial workers were the primary consideration in evaluating site risks. The analysis focused on the contaminants of concern at each of the three subunits. Soil sampling at the subunits determined that the 95-percent upper confidence limit (UCL) of concentration of soil contaminants of concern were 18,000 parts per million (ppm) for BEHP at the Discolored Soil Site, 15 ppm for PCB's at the Ephemeral Pool, and 38 ppm for PCB's at the HRL. The 95-percent UCL is the concentration value for which there is a 95-percent certainty that the mean concentration falls below it. This value is more conservative than an average concentration. Based on these values, the lifetime incremental cancer risks from contaminants at each area for an onsite industrial worker exposure are 2E-05 for the Discolored Soil Site, 2E-05 for the Ephemeral Pool, and 5E-05 for the HRL. This means for the 1100-EM-1 OU, as a whole, the maximum additional risk of an onsite industrial worker being diagnosed with cancer is five in one hundred thousand. This risk is associated with long-term exposure to PCB-contaminated soils at the HRL. These risks are within the acceptable range (10E-04 to 10E-6) used by EPA. Remedial actions generally are not warranted at these risk levels unless there are other considerations such as adverse environmental impacts, potential for future migration, or uncertainty regarding future land use. Under a future residential scenario, if no cleanup actions were undertaken, the potential long-term risks for each subunit would be; 2E-03 for the Discolored Soil Site; 1E-03 for the Ephemeral Pool; and 3E-03 for the HRL.

The HI for all areas under the industrial scenarios is less than 1. For the future residential scenario, the HI for the Discolored Soil Site is 18; the HI for the Ephemeral Pool is 2.5; and the HI for the HRL is 1.2. Though site risks are low, and DOE believes that the future land use is likely to remain industrial, EPA, Ecology, and DOE agreed to evaluate cleanup goals at the more stringent residential levels under the State of Washington Model Toxics Control Act (MTCA) where practicable. The Final RI/FS-EA Report indicates that it is practicable to meet MTCA *residential* cleanup standards at both the Discolored Soil Site and the Ephemeral Pool. The BEHP-contaminated soil at the Discolored Soil Site subunit will be remediated to concentrations below 71 ppm, and the PCB-contaminated soil at the Ephemeral Pool subunit will be remediated to concentration levels at or below 1 ppm. Because of the uncertainty and physical risks associated with excavating in old landfills, as well as the widespread, low levels of PCB's present in the landfill, meeting the more stringent MTCA requirements was not deemed practicable for the HRL subunit. The MTCA industrial criteria were used to evaluate a PCB-contaminated soil cleanup level of 17 ppm. If that cleanup level were met, the incremental potential cancer risk for the HRL would be reduced from 5E-05 to 2E-5. For the other subunits, if the cleanup levels discussed above were met, the incremental cancer risks would be reduced to 9E-08 at the Discolored Soil Site and 1E-06 at the Ephemeral Pool.

The groundwater contaminants do not present any risks to human health under the current and expected future industrial land use scenario because: (1) current and future downgradient users are supplied by the City of Richland water distribution system and (2) the remedial investigation determined that the North Richland well field is not impacted by the contaminant plumes. It should be emphasized that the well field is approximately 2 miles southeast of the HRL, while the contaminant plume is travelling to the northeast. However, DOE performed an uncertainty risk assessment for groundwater using the highly conservative assumption of a residential exposure scenario. This analysis determined that a lifetime incremental cancer risk associated with the current levels of TCE would be 3E-05 in the event that drinking water wells were installed in the contaminant plume. The calculation was based on the 95-percent UCL concentration of 75 parts per billion (ppb) for TCE. The HI, based on the ingestion of nitrate at the 95-percent UCL of 45 ppm, would be 0.8. It should be emphasized that residential use of the land or groundwater is unlikely within the next 20 years.

As with soil contamination, the potential risks associated with the contaminated groundwater are within the acceptable risk range established by EPA for CERCLA sites. However, DOE has agreed to meet the MTCA groundwater criteria for industrial sites. Under that regulation, the groundwater must meet the Safe Drinking Water Act Maximum Concentration Levels (MCL's) of 5 ppb for TCE, and 10 ppm for nitrate. Attainment of MCL's needs to be addressed because groundwater as a drinking water source in the future cannot be ruled out entirely. Achieving MCL's in groundwater would reduce the lifetime incremental cancer risk for TCE to 1E-06 and the HI for nitrate to 0.17.

SUMMARY AND EVALUATION OF ALTERNATIVES

The remedial alternatives evaluated for the 1100-EM-1 OU are presented below. Because soil and groundwater contamination are independent of each other at this OU (soil contaminants of concern were not detected above screening levels in groundwater), the Final RI/FS-EA Report evaluated soil and groundwater alternatives separately. The independent evaluations for soils are designated "S" and for groundwater are designated "GW." A complete discussion of technologies that were evaluated is presented in section 8.0 of the Final RI/FS-EA Report. The Final RI/FS-EA Report evaluated remedial actions by subunits, as well as by overall media (soils). The purpose of utilizing that approach was to take advantage of economies of scale that would be realized by applying one remedial technology to all of the contaminated soils (e.g., incineration of all soils contaminated with organics versus incineration of some and bioremediation of others). The technologies, subunits, and combinations are presented in table 8-1 of the Final RI/FS-EA Report. Because individual and combined subunit remedial alternatives were evaluated, technologies appear in more than one heading. In order to simplify this Plan, the multiple headings for soil alternatives have been combined into general headings for each of the subunits. After each general heading, the corresponding headings from the Final RI/FS-EA Report are listed in parentheses.

Common Elements. All alternatives utilize institutional controls that consist of maintaining the current industrial land use, restricting access to those sites on which some contaminants would remain in place, continuing to supply downgradient consumers of water through the City of Richland distribution network, and continuing groundwater monitoring.

The preferred alternative for each of the 1100-EM-1 subunits is:

Discolored Soil Site; Alternative S-2, Offsite incineration of BEHP-contaminated soils.

Ephemeral Pool; Alternative S-1, Off-site disposal.

Horn Rapids Landfill; Alternative S-1, Asbestos Cap

Groundwater; Alternative GW-1, Natural attenuation and monitoring for compliance with MCL's.

The preferred alternative is believed to provide the best balance of trade-offs among the alternatives with respect to the nine evaluation criteria used to evaluate remedies. A description of those criteria is presented in the glossary on page 6. The criteria fall into three categories. The first two [protection of human health and the environment and attainment of applicable or relevant and appropriate requirements (ARAR's)] are considered threshold criteria and in general must be met or require waivers. The next five are considered balancing criteria and are used to compare technical and cost aspects of alternatives. The final two criteria (State and Community Acceptance) are considered modifying criteria. Modifications to remedial actions may be made based upon state and local comments and concerns. These are evaluated after all public comments have been received.

SOIL

DISCOLORED SOIL SITE SUBUNIT

Alternative S-0: No Action. The CERCLA process requires that a "no action" alternative be evaluated to establish a baseline for comparison. Under this alternative, no active action would be taken to remediate the Discolored Soil Site.

Alternative S-1 (S-1B and S-1D): Onsite Bioremediation. The BEHP-contaminated soil would be bioremediated. The treatment operations would comply with Resource Conservation and Recovery Act (RCRA) requirements. The treated soil would be placed back into the excavated area if treatment standards are achieved.

Alternative S-2 (S-2B and S-2D): Onsite Incineration. The BEHP-contaminated soil would be incinerated onsite. The residuals from the incineration would be placed back in the excavated area and covered with 15 centimeters (6 inches) of soil.

Alternative S-3 (S-3B and S-3D): Offsite Incineration. Under this alternative, the BEHP-contaminated soil would be excavated, transported by a licensed hazardous waste hauler, treated at an RCRA permitted incinerator, and the ash disposed of in an RCRA permitted landfill. The excavated area would be backfilled with clean fill.

EVALUATION OF ALTERNATIVES FOR THE DISCOLORED SOIL SITE SUBUNIT

Overall Protection of Human Health and the Environment. Alternative S-0 does not address the BEHP soil contamination. Alternative S-1 would be expected to reduce the levels of BEHP contamination, although the degree to which this would be successful is unknown. Alternatives S-2 and S-3 would be expected to provide the greatest degree of effectiveness.

Compliance with ARAR's: Alternative S-0 does not comply with ARAR's. Alternative S-1 may not be efficient

enough to meet MTCA cleanup levels. Alternatives S-2 and S-3 would be expected to meet cleanup levels. Both would be required to comply with appropriate transportation, storage, and disposal (TSD) requirements.

Long-Term Effectiveness and Permanence: Alternative S-0 does not address these factors. Alternative S-1 has the potential for a high degree of success. Alternatives S-2 and S-3 would have the highest degree of long-term effectiveness and permanence.

Reduction in Toxicity, Mobility, or Volume: Alternative S-0 does not address these factors. Alternatives S-2 and S-3 address these factors more completely through complete destruction than does S-1.

Short-Term Effectiveness: Alternative S-0 would pose no onsite remedial construction or implementation risks to workers since no action would be taken. The speed with which it addresses subunit risks is not relevant for S-0. Alternatives S-1, S-2, and S-3 are comparable from the standpoint of having minimal construction or implementation risks due to the low volume of soil to be remediated and the associated low level of remedial activities. Alternatives S-2 and S-3 would be expected to be completed more rapidly than S-1 due to the uncertainties associated with bioremediation.

Implementability: This criterion does not apply to S-0. Alternatives S-1 and S-2 would require some onsite training and monitoring for effectiveness. All components of S-3 are readily available.

Cost: The costs associated with the three alternatives are:

	S-0	S-1	S-2	S-3
Capital	0	997	1,491	2,131

(Costs in thousands of dollars, Present Worth does not apply)

EPHEMERAL POOL SUBUNIT

Alternative S-0: No Action. The CERCLA process requires that a "no action" alternative be evaluated to establish a baseline for comparison. Under this alternative, no active action would be taken to remediate the soils at the Ephemeral Pool subunit.

Alternative S-1 (S-1B, S-1D, S-5B, and S-5D) Offsite Disposal: The Ephemeral Pool soils contaminated with PCB's above 1 ppm would be excavated, transported by a licensed waste hauler, and disposed of in an appropriately permitted facility. The excavated area would be regraded and backfilled with clean soil.

Alternative S-2 (S-2B and S-2D): Onsite Incineration: The PCB-contaminated soils would be incinerated onsite in a rotary kiln. The residuals from the incineration would be placed back in the excavated area and covered with
15 centimeters (6 inches) of soil.

Alternative S-3 (S-3B, S-3D) Offsite Incineration: The Ephemeral Pool soil contaminated with PCB's above 1 ppm would be excavated, transported by a licensed waste hauler, treated at a RCRA permitted offsite incinerator, and the ash disposed of in a RCRA permitted landfill. The excavated area would be backfilled with clean material and regraded.

EVALUATION OF ALTERNATIVES FOR THE EPHEMERAL POOL SUBUNIT

Overall Protection of Human Health and the Environment: Alternative S-0 does not address this criterion. Alternatives S-1, S-2, and S-3 are protective by eliminating potential onsite risks.

Compliance with ARAR's: Alternative S-0 does not address ARAR's. Alternatives S-1, S-2, and S-3 would be required to comply to meet ARAR's for remediation as well as for TSD facilities.

Long-Term Effectiveness and Permanence: Alternative S-0 does not address this criterion. Alternatives S-2 and S-3 have a higher degree of permanence and effectiveness than S-1, due to the permanent destruction by incineration.

Reduction of Toxicity, Mobility, or Volume: Alternative S-0 does not address this criterion. Alternatives S-2 and S-3 have a greater degree of reduction than S-1 since contaminants are destroyed.

Short-Term Effectiveness: Alternative S-0 does not address short-term exposure risks. Construction and implementation hazards associated with alternatives S-1 and S-3 are equivalent and can be mitigated through proper construction management. Alternative S-2 would require a greater degree of control for onsite activities.

Implementability: Alternative S-0 is not relevant to this criterion. The technologies to implement S-1, S-2, and S-3 are readily available.

Cost: The costs associated with the alternatives are:

	S-0	S-1	S-2	S-3
Capital	0	356	1,391	1,214

(Costs in thousands of dollars, Present Worth does not apply)

HRL SUBUNIT

Alternative S-0: No Action. The CERCLA process requires that a "no action" alternative be evaluated to establish a baseline for comparison. Under this alternative, no active action would be taken to remediate the HRL subunit.

Alternative S-1: Asbestos Cap. The HRL would be capped with 60 centimeters (2 feet) of clean soil to meet Federal requirements for capping inactive landfills containing asbestos. In addition, a 2-meter (6-foot) high, 1,830-meter (6,000-foot) chain link security fence posted with warning signs would be constructed to restrict access to the HRL.

Alternative S-2: Municipal Landfill Cap. Under this alternative, the HRL would be capped in accordance with the State of Washington requirements for

- **Overall Protection of Human Health and Environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

- **Compliance with ARAR's** addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal or State environmental statutes and/or provide grounds or invoking the waiver.

- **Long-term effectiveness and permanence** refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

- **Reduction of toxicity, mobility, or volume through treatment** is the anticipated performance of the treatment technologies that may be employed in a remedy.

- **Short-term effectiveness** refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.

- **Implementability** is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the solution.

- **Cost** includes capital and operation and maintenance costs.

- **State Acceptance** indicates whether, based on its review of the Final RI/FS-EA Report and Plan, the State concurs with, opposes, or has no comment on the preferred alternative.

- **Community Acceptance** will be assessed in the ROD following a review of the public comments received on the Final RI/FS-EA Report and the Plan.

GLOSSARY OF EVALUATION CRITERIA

capping a municipal solid waste landfill in an arid region. This is an impermeable cap that consists of a minimum 15-centimeter (6-inch) topsoil cover, an underlying 50-mils (0.05-inch) thick synthetic liner, and a subgrade of random fill in order to establish sufficient grades for surface water runoff.

EVALUATION OF ALTERNATIVES FOR THE HRL

Overall Protection of Human Health and the Environment. Alternative S-0 does not address this criterion. Alternative S-1 eliminates exposure pathways associated with fugitive dust containing asbestos and potential contact with contaminated soils. Alternative S-2 also achieves this level of protection and provides an additional measure of protection to groundwater beneath the HRL by reducing infiltration of rainwater through the HRL.

Compliance with ARAR's. Alternative S-0 does not address this criterion. Alternatives S-1 and S-2 meet Federal requirements for capping inactive asbestos and PCB-containing landfills. Alternative S-2 also meets state requirements for municipal solid waste landfills.

Long-Term Effectiveness and Permanence. Alternative S-0 does not address this criterion. Alternative S-1 will be effective in addressing asbestos and PCB's as long as the cap remains intact. Alternative S-2 will also be effective for these contaminants as long as the cap remains intact.

Reduction in Toxicity, Mobility, or Volume. Alternative S-0 does not address this criterion. Alternative S-1 reduces the mobility of contaminants through the fugitive dust pathway. Alternative S-2 would also reduce fugitive dust and provide an additional measure of reduction of infiltration of rainwater into the HRL, which in turn would reduce the potential of contaminants leaching to groundwater from the HRL.

Short-Term Effectiveness. Alternative S-0 does not address potential risks at the HRL and does not pose any short-term implementation hazards. Alternatives S-1 and S-2 both pose implementation hazards associated with fugitive dust. This can be mitigated with dust suppressants during construction. Both can be readily implemented, although S-1 can be implemented somewhat faster than S-2 which requires specialized equipment to install the synthetic liner.

Implementability. Alternative S-0 does not address this criterion. Alternatives S-1 and S-2 are readily implementable through existing technologies.

Cost: The costs associated with the three alternatives are:

	S-0	S-1	S-2
Capital	0	2,131	5,445
O&M	52	41	41
P W	802	2,754	6,608

(Costs in thousands of dollars)

GROUNDWATER

Alternative GW-0: No Action. The CERCLA process requires that a "no action" alternative be evaluated to establish a baseline for comparison. Under this alternative, the current groundwater monitoring wells would be sampled on an annual basis to identify any future releases.

Alternative GW-1: Monitor for Compliance. Under this alternative, the groundwater contamination would be allowed to attenuate naturally. Groundwater monitoring and modelling has indicated that the TCE plume is

expected to attenuate to levels below MCL's by the year 2017. Under this alternative, additional wells would be installed and monitored along George Washington Way as a point of compliance. In the event that TCE concentrations exceed MCL's there, active groundwater remediation would be evaluated.

Alternatives GW-2A, GW-2B, GW-3A, and GW-3B: Groundwater Extraction and Treatment. Under these alternatives, one or more groundwater extraction wells would be installed and the contaminated water would be treated through one of two treatment processes prior to reinjection.

Alternative GW-2A: TCE removal from contaminated groundwater would be accomplished through airstripping. Air emissions from this process would contain low levels of TCE that are not expected to require additional treatment. The treatment system would operate at 27 liters per minute (Lpm) [100 gallons per minute (gpm)]. TCE levels would be expected to reach MCL's in groundwater by the year 2012.

Alternative GW-3A: This is the same process as GW-2A. However, this system would utilize three extraction wells and operate at 80 Lpm (300 gpm). TCE levels in groundwater would be expected to reach MCL's by the year 2008.

Alternative GW-2B: TCE removal from extracted groundwater would consist of a multimedia filter, UV radiation/chemical oxidation treatment unit using ozone and hydrogen peroxide to destroy TCE. In this process, TCE is chemically destroyed and converted to carbon dioxide and water. The process would operate at 80 Lpm (100 gpm) and TCE levels in groundwater would be expected to reach MCL's by the year 2012.

Alternative GW-3B: This is the same process as GW-2B. However, this system would utilize three extraction wells and operate at 80 Lpm (300 gpm). TCE levels would be expected to reach MCL's in groundwater by the year 2008.

EVALUATION OF GROUNDWATER ALTERNATIVES

Overall Protection of Human Health and the Environment. Alternative GW-0 does not address contamination present in groundwater. However, the groundwater is not currently or projected to be used for drinking water and the North Richland well field is not affected by the contaminant plume. Alternative GW-1 provides for monitoring, the continuation of current institutional controls (restriction on potable well permits), and evaluation of active remediation in the event of changing water usage and/or unexpected contaminant migration. Alternatives GW-2A, GW-2B, GW-3A, and GW-3B would provide for active remediation.

Compliance with ARAR's. All the alternatives would be expected to achieve ARAR's, although the timeframes vary from 16 to 25 years.

Long-Term Effectiveness and Permanence. All the alternatives would be expected to provide long-term effectiveness once cleanup goals are attained. As noted above, the timeframes to achieve cleanup goals vary.

Reduction in Toxicity, Mobility, or Volume. All alternatives reduce TCE toxicity, although at different timeframes. Alternatives GW-0 and GW-1 do not reduce mobility and would result in a larger volume of lower level TCE contaminated groundwater. Alternatives GW-2A, GW-2B, GW-3A, and GW-3B all employ technologies that would reduce mobility and volume. Alternatives GW-2B and GW-3B would provide the most immediate reduction in toxicity by destroying TCE in the treatment process.

Short-Term Effectiveness. Alternatives GW-3A and GW-3B would achieve cleanup goals in the shortest timeframe (approximately 16 years). Emissions from the air stripper used in GW-2A and GW-3A are relatively low and should not require additional treatment. Neither the active nor passive alternatives pose any adverse risks for implementation.

Implementability. All alternatives are readily implementable. The treatment processes associated with extraction and treatment would require regulatory review for compliance with relevant environmental regulations.

Cost: The costs for the alternatives are:

	GW-0	1	2A	2B	3A	3B
CAP	0	685	1,536	2,072	3,557	4,228
O&M	0	0	232	238	481	514
PW	0	1,059	5,111	5,714	8,989	9,970

(Costs are in thousands of dollars)

SUMMARY OF PREFERRED ALTERNATIVE

In summary, the preferred alternative would reduce the risks associated with the site by removing and treating or disposing of contaminated soils from the Discolored Soil and Ephemeral Pool subunits. Exposure to contaminants at the HRL would be reduced by imposing access restrictions and by providing an asbestos cap to prevent fugitive dust emissions. These soil remedial actions could be completed within a 6 month timeframe. Groundwater contamination would be reduced to below MCL's under this alternative. The timeframe to achieve MCL's in groundwater using this alternative is approximately 22 years, which is longer than the timeframes for remediation under Plans 2A, 2B, 3A, and 3B. However, because this groundwater is not used as a drinking water source, there are no current potential risks to human health. The additional cost ($4M to $8M) required to actively remediate the groundwater does not appear to be warranted given the fact that there are no current or foreseeable risks. The preferred alternative meets the statutory preference of treating those contaminated soils for which treatment is practicable, containing soils where treatment is impracticable, and applying institutional controls to reduce the potential of exposure to contaminants and to monitor to insure that no future releases occur.

THE COMMUNITY'S ROLE IN THE SELECTION PROCESS

EPA solicits input from the community on the cleanup methods proposed for each Superfund remedial action. EPA has established a public comment period from __ through __, 1993, to encourage public participation in the cleanup selection process. The comment period includes public meetings at which EPA and Ecology will present the Final RI/FS-EA Report and the Proposed Plan, answer questions, and accept both oral and written comments.

A public meeting is scheduled for __, __, 1993, and will be held at the ____.

Comments will be summarized and responses provided in the Responsiveness Summary section of the Record of Decision (ROD). The ROD is the document that present's EPA's final selection for cleanup. To send written comments or obtain further information, contact:

(name)
Community Relations Coordinator
U.S. Environmental Protection Agency
(address)
(phone)
(hours of business)

TABLE 1. Directory of NEPA Values and Location in 1100-EM-1 Documents

NEPA VALUE	1100-EM-1 DOCUMENT DOE/RL-90-18	1100-EM-1 DOCUMENT DOE/RL-92-67
PHYSICAL CHARACTERISTICS		
Operable Unit Vicinity	Section 3.1	Section 1.4
Meteorology	Section 3.2	Section 2.1
Hydrology	Section 3.3	Section 2.3
Geology	Section 3.4	Section 2.2
ECOLOGICAL CHARACTERISTICS		
Human Ecology	Section 3.7.1	
Land Use	Section 3.7.1.1	
Water Use	Section 3.7.1.2	
Cultural Resources	Section 3.7.1.3	
Wildlife Ecology	Section 3.7.2	Appendix L
Terrestrial Ecology	Section 3.7.2.1	
Aquatic Ecology	Section 3.7.2.2	
Sensitive Environments	Section 3.7.2.3	
IMPACTS OF REMEDIAL ACTIONS		
Compliance with Statutory Law		Section 9.1.2, Appendix M
Short-Term Impacts		Section 9.1.5,
Long-Term Impacts		Section 9.1.3,
Impacts to Resources		Section 9.1.6, Appendixes G and N
Effects to Public Health		Sections 5.1, 5.2, 7.2, 9.2, Appendix K
AGENCIES/PERSONS CONTACTED		Section 1.2
LAND USE, POLICIES, CONTROLS		Section 7.2.4, Appendix J

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